NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-1
April 6, 2004
Person Responsible: Sean Casten

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-1

Please provide copies of (1) any and all prefiled testimony or reports (including all associated exhibits and attachments) submitted by Mr. Casten to state and federal regulatory authorities from 1999 to the present; and (2) any and all transcripts of Mr. Casten's testimony at hearings (adjudicatory or non-adjudicatory) before state and federal regulatory authorities from 1999 to the present.

Response

Mr. Casten did not submit prefiled testimony or provide testimony in any adjudicatory or non-adjudicatory hearings before state or federal regulatory authorities.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-2
April 6, 2004
Person Responsible: Sean Casten

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-2

Provide copies of any and all regulatory decisions addressing the issues covered by Mr. Casten in testimony provided in response to NSTAR-NEDGC-1-1. Identify the decision making authority, docket number, year of the decision, and any official citation to the decision.

Response

Mr. Casten did not provide any testimony. See the response to NSTAR-NEDGC-1-1.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-3
April 6, 2004
Person Responsible: Sean Casten

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-3

Please identify all documents relied upon by Mr. Casten in preparing this testimony. Please provide a copy of each identified document.

Response

In preparing his testimony, Mr. Casten relied on the proposed Rates SB-1 and SB-2 filed by NSTAR and the T-2, G-2 and G-3 rate structures available on NSTAR's website as of March 2004.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-4

Please provide a copy of any and all articles, papers, speeches or other reports prepared in whole or in part by Mr. Casten addressing, distributed generation, standby rates and/or rate design.

Response

Please see the following attachments:

Attachment NSTAR-NEDGC 1-4(a): Casten, Sean and Thomas O'Brien. "Approaching Free Electricity: How the Real World Differs from Thermodynamic Models", *Cogeneration and Competitive Power Journal*, Vol. 18, No. 1, Winter 2003.

Attachment NSTAR-NEDGC 1-4(b): Casten, Sean. "Are Standby Rates Ever Justified? The Case Against Electric Utility Standby Charges as a Response to On-site Generation", *The Electricity Journal*, Vol. 16, No. 4, May 2003.

Attachment NSTAR-NEDGC 1-4(c): Casten, Sean. "Five Aces and a Winking Dealer: The Costs and Reasons for the U.S.'s Failure to Invest in Energy Efficiency", *Strategic Planning for Energy and the Environment*, Vol. 23, No. 2, Fall 2003.

Attachment NSTAR-NEDGC 1-4(d): Casten, Sean. "Free Electricity from 'Heat-First' CHP", *Cogeneration & On-Site Power Production*, Vol. 4, No. 3, May-June 2003.

Attachment NSTAR-NEDGC 1-4(e): Casten, Sean and Thomas O'Brien. "Free Electricity from Steam Turbine Generators: A System Level Economic Analysis", *District Energy*, Vol. 89, No. 1, First Quarter 2003.

Attachment NSTAR-NEDGC 1-4(f): Casten, Sean. "Rebuttal: How Far We Have to Go", *The Electricity Journal*, Vol. 16, No. 8, October 2003.

Attachment NSTAR-NEDGC 1-4(g): Casten, Sean. "Ten Questions for Electric Utility Regulators", Energy Pulse, November 18, 2003.

Attachment NSTAR-NEDGC 1-4(h): Casten, Thomas and Sean Casten. "Transforming Electricity", *Northeast Midwest Economic Review*, Northeast Midwest Institute, November/December 2001, Washington DC.

Attachment NSTAR-NEDGC 1-4(i): Casten, Thomas and Sean Casten. "Transforming Electricity in the U.S.: Barriers and Opportunities", *Cogeneration and On-Site Power Production*, Vol. 2, Issue 6, Nov-Dec 2001.

Attachment NSTAR-NEDGC 1-4(j): *Proposed Regulatory Frameworks for MA to Maximize the Value Delivered by DG*, Powerpoint Presentation to the DG Process Committee on January 26, 2003, Newton MA.

Attachment NSTAR-NEDGC 1-4(k): *Presentation to MA Task Force on Utility Reliability*, Powerpoint Presentation, December 8, 2003.

Attachment NSTAR-NEDGC 1-4(l): *Recycled Energy in Massachusetts Enhancing the Economic and Environmental Performance of the Renewable Energy Trust Fund.*

Attachment NSTAR-NEDGC 1-4(m): *Letter to Mary Cottrell dated July 31, 2003* providing comments of the Northeast Combined Heat and Power Initiative to the Massachusetts Department of Telecommunications and Energy regarding Investigation 02-38

Attachment NSTAR-NEDGC 1-4(n): *Letter to Louise Rickard, dated October 16,* 2002 providing comments of members of the Northeast Combined Heat and Power Initiative to the Connecticut Department of Public Utility Control regarding Docket 02-08-20, "DPUC Investigation of the Federal Energy Regulatory Commission's Advance Notice of proposed Rulemaking Entitled Standardization of Small Generator Interconnection Agreements and Procedures"

Please note that this Response represents a Bulk Document and as such, one original and one copy are being delivered to the Department, and one copy shall be delivered to NSTAR.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-5

Referring to page 3, lines 8-18, please provide the date, duration and size (MW) of outages since the generator came on line. Please indicate whether each outage was planned or forced.

Response

Turbosteam is not privy to this information at the level of detail requested, because the company's responsibility was limited to the provision of the capital equipment to Suffolk County Jail. Our knowledge of the system post-installation is limited to occasional requests for service and minor system upgrades. While we can say confidently that there have been no major performance issues since commissioning, we cannot provide detailed information on the more minor routine maintenance which has occurred.

However, we can provide the following more general information. Energy and Environmental Analysis, a Washington DC based consulting firm was recently retained by Oak Ridge National Laboratory to survey actual, in-field distributed generation technologies to determine their operational and reliability characteristics. Their final report was issued in January, 2004 and is entitled "Distributed Generation Operational Reliability and Availability Database". The 99-page report is provided as Attachment NEDGC 1-5. The report examines a broad population of DG systems and breaks the reliability down by technology, with comparisons to the central power technologies that they displace. This macro-level analysis is thus ideally suited to answer the implicit question posed by NSTAR-NEDGC-1-5: Namely, what kind of reliability can a utility expect to see from a DG installation for the purposes of system planning. The summary table of all DG equipment shown on page 4-2 of their final report is reprinted below for convenience:

Technology	# units surveyed	Avg availability (%)	Forced Outage Rate (%)	Mean time between forced outages (hrs)	Mean down time (hrs)
Reciprocating engines <100 kW	14	97.93	1.76	784.75	13.71
Reciprocating engines 100 – 800 kW	8	95.99	1.98	1,352.26	50.66

Reciprocating engines 800 kW – 3 MW	18	98.22	0.85	3,582.77	27.06
Fuel cells <200 kW	15	76.84	22.94	2,004.47	369.24
Gas turbines 500 kW – 3 MW	11	97.13	2.89	2,219.72	65.38
Gas turbines 3 MW – 20 MW	21	94.97	2.88	1,956.46	68.63
Gas turbines 20 MW – 100 MW	9	93.53	1.37	3,604.62	75.30
Steam turbines <25 MW	25	92.02	2.34	5,317.73	292.06
Entire Sample	121	93.09	4.65	2,869.83	138.53

EEA also compared these statistics to those of conventional central power plants, as provided by the North American Reliability Grid's Generating Availability Report. This data is summarized below.

Central Power Technology	# units surveyed	Avg availability (%)	Forced Outage Rate (%)
Fossil-fired steam boiler	1,524	86.66	5.16
Nuclear	128	82.87	7.83
Gas Turbine	887	90.31	41.40
Combined Cycle	80	85.85	3.24
Hydro	823	90.62	4.68

The unambiguous conclusion of this data is that on any metric of reliability, DG is actually more reliable than central power plants. Thus, one would presume that the same planning methodologies used by distribution utilities to plan for upstream power supplies could be equally applied to DG technologies. The proposed NSTAR rate, which is based on the presumption that they need to require 100% backup capacity for every DG unit in the field is thus off by a factor of 10.

Thus, while we do not have detailed maintenance logs for our installation at Suffolk County Jail, we would suggest that this aggregated data is the more useful data to calculate the likely outage rate of the broad population of DG technologies which would be affected by NSTAR's proposed standby rate.

Please note that this Response represents a Bulk Document and as such, one original and one copy are being delivered to the Department, and one copy shall be delivered to NSTAR.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-6
April 6, 2004
Person Responsible: Sean Casten

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-6

Referring to page 3, lines 15-18, please identify the year-by-year investment in the system, including construction and operating costs and annual electricity savings. Please identify all assumptions adopted to develop this response and provide copies of the calculation of the $15,000 savings and any and all documents that relate to this response.

Response

See the response to NSTAR-NEDGC 1-5 with respect to the availability of data from Suffolk County Jail. The data we presented on savings for the system was compiled from interviews with steam plant personnel at the jail in preparation for a 2002 site tour which was arranged as a part of the United States Combined Heat and Power Association's annual Policy Day meeting in Boston, MA that spring. The data from those interviews was compiled in a brief case study which is included as Attachment NEDGC 1-6.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-7

Referring to page 4, lines 2-18, please describe in detail any and all electric self-generations systems designed by your company that have been installed by customers in Massachusetts. The identity of the customers may be redacted to protect their privacy. The description shall include, but not be limited to the following information:

(a) the installation date of the system;

(b) the size (i.e., nameplate rating) of the self-generation unit;

(c) the thermal source used to generate electricity;

(d) the fuel used to produce the energy;

(e) the annual number of kilowatt-hours produced (actual and estimated);

(f) the annual number of hours the self-generation unit is operational.

(g) the date, duration and size (MW) of outages since the generator came on line. For each outage identify whether it was forced or planned.

Response

1) System Name: Western MA paper mill

(a) Installation date: April 2004 (scheduled)

(b) Nameplate rating: 851 kW

(c) Thermal source for electricity: Steam pressure drop from existing distribution system

(d): Oil-fired steam boiler, but turbine-generator operates on steam without respect for upstream steam production technology and the turbine generator has little if any impact on actual upstream fuel usage, as explained previously. As a result, the actual fuel used in boiler is not relevant for system design or operation.

(e)–(g) This system is not yet operational, but will be sold on a capital sale wherein Turbosteam will not be responsible for the recording of detailed system operating and outage characteristics beyond those of normal warranty obligations. As such, we will not have access to the data requested after the system commences operation.

2) System Name: Suffolk County Jail, Boston MA

(a) Installation date: April, 1998

(b) Nameplate rating: 100 kW

(c) Thermal source for electricity: Steam pressure drop from existing distribution system

(d) Fuel: unknown

(e) –(g) This system was sold on a capital sale wherein Turbosteam was not responsible for the recording of detailed system operating and outage characteristics beyond those of normal warranty obligations. As such, we do not have access to the data requested. The system is known to be currently operational, and to our knowledge has suffered no major outages or other service problems since commissioning.

3) System Name: Trigen Boston, Boston MA

(a) Installation date: March 1997

(b) Nameplate rating: 520 kW

(c) Thermal source for electricity: Steam pressure drop between high pressure steam boiler and medium pressure distribution network

(d) Fuel: unknown

(e) –(g) This system was sold on a capital sale wherein Turbosteam was not responsible for the recording of detailed system operating and outage characteristics beyond those of normal warranty obligations. As such, we do not have access to the data requested. The system is known to be currently operational, and to our knowledge has suffered no major outages or other service problems since commissioning.

4) System Name: Central MA Hospital

(a) Installation date: April 1991

(b) Nameplate rating: 149 kW

(c) Thermal source for electricity: Steam pressure drop in existing steam system

(d) Fuel: unknown

(e) –(g) This system was sold on a capital sale wherein Turbosteam was not responsible for the recording of detailed system operating and outage characteristics beyond those of normal warranty obligations. As such, we do not have access to the data requested. The system is known to be currently operational, and to our knowledge has suffered no major outages or other service problems since commissioning.

5) System Name: Western MA Paper Mill

(a) Installation date: February 1991

(b) Nameplate rating: 426 kW

(c) Thermal source for electricity: Steam pressure drop in existing steam system

(d) Fuel: municipal solid waste is burned to generate steam for plant use.

(e)–(g) Turbosteam only provided the switchgear and controls on this project; the actual mechanical train was provided by Dresser-Rand. As such, we do not have access to the data requested. The system is known to be currently operational, and to our knowledge has suffered no major outages or other service problems since commissioning.

6) System Name: Eastern MA Paper Mill

(a) Installation date: January 1990

(b) Nameplate rating: 330 kW

(c) Thermal source for electricity: Steam pressure drop in existing steam system

(d) Fuel: unknown

(e)–(g) This system was sold on a capital sale wherein Turbosteam was not responsible for the recording of detailed system operating and outage characteristics beyond those of normal warranty obligations. As such, we do not have access to the data requested. The current operational status of this unit is not known.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-8
April 6, 2004
Person Responsible: Sean Casten

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-8

Referring to page 5, line 7, please (a) define the acronym "ROA;" (b) provide the basis, assumptions and data supporting the finding that projects require a ROA of over 40 percent to proceed; and (c) provide copies of any and all documents that relate to this response.

Response

ROA, or Return on Assets, is a measure of the return realized by a project exclusive of financing or tax charges. It is commonly used when assessing the viability of a project because it allows one to determine a maximum interest rate on any associated debt which could be acquired to still generate a positive cash flow from a project. For example, a project with a $300,000 capital cost that saved $100,000 per year in operating costs would have an ROA calculated based on the implicit return of a $300,000 investment with an annual $100,000 dividend. In effect, ROA is simply an alternative way of expressing a simple payback (which in the previous example would be $300,000/$100,000 or 3 years).

ROA is a measure of project viability used by Turbosteam. Based on our 18 years of experience, we have found that unless projects achieve an ROA greater than 40% (roughly equivalent to a 2 year payback) they are unlikely to be pursued as capital purchases by customers whose core business is not generating electricity. Alternatively, we can offer financing packages in which we obtain 10-year debt at rates of 10 – 20% and split any excess savings between the customer and Turbosteam. Obviously, the ROA must be higher than 20% to justify such a transaction for the customer, and our experience is that it actually must be quite a bit higher – comparable to the levels required for an outright purchase – in order to lead to enough total annual dollars to justify the efforts of all involved.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-9
April 6, 2004
Person Responsible: Sean Casten

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-9

Referring to page 5, lines 3-16, what is the average useful life of the referenced facilities?

Response

We have units that have been operating for 16 years, and are continuing to add up operating lifetime. For tax purposes, depreciation lives for this technology are 7 – 15 years, while book depreciation schedules allow for 20-year lifetimes.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-10
April 6, 2004
Person Responsible: Sean Casten

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-10

Referring to page 5, lines 12-16, please provide any studies, documents and assumptions supporting the statement that self-generation projects "require total energy savings sufficient to recover all capital in 2 years of less"?

Response

Please see the response to NSTAR-NEDGC-1-8.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-11
April 6, 2004
Person Responsible: Sean Casten

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-11

Referring to page 5, lines 12-16, is it the position of Mr. Casten that it is appropriate for the Department to establish standby rates to ensure that self-generation projects "recover all capital in 2 years of less"? If so, please provide the basis for that position and any and all documents that relate to this response.

Response

No.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-12

Referring to page 6, lines 4-7, please provide the basis for the estimate that the proposed standby rates would reduce customer savings by "15-50% per year." Please provide a copy of all calculations, assumptions workpapers, spreadsheets or other documents that show the calculations. The copy should be provided both in paper form and electronically. The electronic version should be in Excel format and show all inputs, formulas and linked sources.

Response

As shown in the accompanying spreadsheet, Attachment NSTAR-NEDGC 1-12, the 15 – 50% estimate was based on examining the impact of the standby rate on a number of different DG operating profiles, and is actually conservative. The precise values that were calculated in the spreadsheet were a 13 – 78% reduction in savings. The analysis done in this spreadsheet was for a generator with a rated power output of 100 kW operating in 5 different operating profiles for customers in three different rate classifications (G-2, T-2 and G-3). The customer load profiles were sized to ensure that the customer would meet the power requirements of a specific rate classification before and after DG installation. The DG operating profiles represent a cross section of DG load shapes to explore the impact of the proposed standby charge on different operating profiles. All are necessarily simplifications of real-world operating profiles to simplify the analysis for modeling purposes.

The operating profiles shown are summarized as follows:

1) *Baseload*: This system design produces a steady 100 kW of power for 365 days/year, 24 hours/day.

2) *Daily-cycling*: This system follows the facility load, producing maximum power during hours of peak facility demand, thereby flattening the overall facility load profile as measured at the utility meter.

3) *Thermal-following CHP*: This system mirrors a CHP plant that generates electricity only when the resulting thermal energy can be used, and thus shows a winter peak on DG operation in spite of the summer peak in facility power demands.

4) *PV*: This system models a solar photovoltaic panel, with peak power produced at 12:00 noon every day and proportionally less as the sun rises and sets. This system produces fewer kWh (but a comparable peak kW) during winter months due to the shorter days.

5) *Thermal-following CHP + 1 day/mo max load*: This system was modeled as a hybrid CHP plant that operates for maximum efficiency during most of its operating season, but cycles up briefly each month to produce peak power and shave facility peak demand.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-13
April 6, 2004
Person Responsible: Sean Casten

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request STAR-NEDGC 1-13

Referring to page 6, lines 17-20, please provide a copy of any and all studies performed by Mr. Casten that assess the impacts of his firm's generators on grid upgrades, congestion and reactive power in the service territories of Boston Edison, Cambridge Electric or Commonwealth Electric.

Response

Please see response to DTE-NEDGC 1-7.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-14
April 6, 2004
Person Responsible: Sean Casten

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Requests NSTAR-NEDGC 1-14

Referring to page 6 line 20 through page 7, line 1, please provide a copy of any and all studies performed by Mr. Casten that assess the relative efficiency of his firm's generators in comparison to the generation serving the customers located in the service territories of Boston Edison, Cambridge Electric and Commonwealth Electric.

Response

Mr. Casten has not previously calculated the generation efficiency of the power consumed by the customers located in the service territories of Boston Edison, Cambridge Electric and Commonwealth Edison. However, Mr. Casten has written a detailed article explaining how to calculate the efficiency from backpressure steam turbine generators. The article, which is entitled "Approaching Free Electricity: How the Real World Differs from Thermodynamic Models", is provided as Attachment NSTAR-NEDGC-1-4 (a).

Empirical evidence for the analysis described in this article is provided by an EPA Energy Star application submitted for an installation at Middlebury College, in Middlebury, Vermont. This application is provided on Attachment NSTAR-NEDGC 1-14. It shows that the Middlebury installation directly leads to more efficient heat utilization on the campus, and thus has a marginal fuel-to-electric "efficiency" of 150% - in other words, for every 1 marginal unit of fuel burned to generate electricity, Turbosteam's generator produces 1.5 units of electricity generated. This is counter-intuitive, but results directly from the reduction in energy waste which accompanies system operation, and is explained in detail in the accompanying article.

Given that the current state of the art for a central power plant is a 50 – 60% efficient combined cycle gas turbine, and given further that the bulk of the power production in New England is not produced in combined cycle gas turbines, it is reasonable to assume based on Turbosteam's prior experience that the generators Turbosteam installs are at least three times as efficient as the average central power station which would otherwise provide power for NSTAR's customers.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-15

Referring to page 7, lines 12-14, please provide a copy of the analysis performed by Mr. Casten that forms the basis of his conclusion that standby customers would in some cases be charged more for distribution service than "would a similarly situated all requirements customer to which [NSTAR Electric] was providing power." The response should include a copy of all calculations, assumptions workpapers, spreadsheets or other documents that show the calculations. The copy should be provided both in paper form and electronically. The electronic version should be in Excel format and show all inputs, formulas and linked sources.

Response

The analysis that provides the basis for Mc. Casten's conclusion the spreadsheet provided as Attachment NSTAR-NEDGC-1-12. The specific results showing the differing costs of distribution service are provided in the 'Summary' worksheet tab and summarized below:

		Current Rates		With Proposed Standby Rate			
DG Operating Mode	Annual kWh generation by DG	Gross Customer Savings ($/yr)	Distribution Savings ($/yr)	Gross Customer Savings ($/yr)	Reduced Distribution Savings due to S/B rate ($/yr)	% reduction in savings	% of Distribution Savings reduced by S/B rate
1. G-3/SB-1 Rate Calculations							
Mode 1	878,400	$69,366	$21,519	$60,238	$9,128	13%	42%
Mode 2	697,103	$57,388	$19,201	$49,273	$8,115	14%	42%
Mode 3	511,080	$35,274	$8,142	$30,760	$4,514	13%	55%
Mode 4	175,680	$25,262	$13,864	$16,134	$9,128	36%	66%
Mode 5	522,080	$40,982	$12,476	$31,854	$9,128	22%	73%
2. T-2/SB-1 Rate Calculations							
Mode 1	878,400	$74,528	$26,802	$60,980	$13,548	18%	51%
Mode 2	697,103	$61,601	$23,518	$49,545	$12,056	20%	51%
Mode 3	511,080	$36,926	$9,836	$30,267	$6,659	18%	68%

Mode 4	175,680	$28,395	$17,092	$14,847	$13,548	48%	79%
Mode 5	522,080	$43,964	$15,530	$30,416	$13,548	31%	87%
3. G-2/SB-2 Rate Calculations							
Mode 1	878,400	$69,075	$20,765	$50,839	$18,236	26%	88%
Mode 2	697,103	$59,212	$18,761	$41,134	$18,078	31%	96%
Mode 3	511,080	$34,305	$7,205	$24,427	$9,878	29%	137%
Mode 4	175,680	$25,331	$13,561	$5,691	$19,640	78%	145%
Mode 5	522,080	$40,843	$12,059	$21,203	$19,640	48%	163%

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-16
April 6, 2004
Person Responsible: Sean Casten

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-16

Referring to page 8, line 20 through page 9, line 1, please provide a copy of any and all studies performed by Mr. Casten that identifies the deferral of expensive transmission and distribution upgrades resulting from the installation of DG in the service territories of Boston Edison, Cambridge Electric or Commonwealth Electric.

Response

Please see response to DTE-NEDGC 1-7.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-17
April 6, 2004
Person Responsible: Sean Casten

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-17

Referring to page 9, lines 13-16, please provide a copy of any and all studies performed by Mr. Casten that assess and/or quantify the impacts of the proposed standby rates on:

(a) DG systems that are base-loaded;

(b) DG systems that are winter peaking;

(c) DG systems that are summer peaking;

(d) DG systems that show strong daily load fluctuations.

Response

Please see responses to NSTAR-NEDGC-1-12 and NSTAR-NEDGC-1-15 for studies showing the impact of the proposed standby rates on these system designs.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-18
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-18

Please provide copies of (1) any and all prefiled testimony or reports (including all associated exhibits and attachments) submitted by Mr. Vardakas to state and federal regulatory authorities from 1999 to the present; and (2) any and all transcripts of Mr. Vardakas's testimony at hearings (adjudicatory or non-adjudicatory) before state and federal regulatory authorities from 1999 to the present.

Response:

See Attachment NSTAR-NEDGC 1-18

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-19
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-19

Provide copies of any and all regulatory decisions addressing the issues covered by Mr. Vardakas in testimony provided in response to NSTAR-NEDGC-1-17. Identify the decision making authority, docket number, year of the decision, and any official citation to the decision.

Response:

See Attachment I to Mr. Vardakas's prefiled direct testimony.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-20
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-20

Please identify all documents relied upon by Mr. Vardakas in preparing this testimony. Please provide a copy of each identified document.

Response:

The documents Mr. Vardakas relied on are attached to his prefiled direct testimony.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-21
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-21

Please provide a copy of any and all articles, papers, speeches, presentation or other reports prepared in whole or in part by Mr. Vardakas addressing, distributed generation, standby rates and/or rate design.

Response:

See Attachments NSTAR-NEDGC 1-21(a) and (b).

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-22
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-22

Please provide a copy of all correspondence with existing customers concerning NSTAR Electric's proposed standby rates.

Response:

The only written correspondence regarding NSTAR's backup rate is the MHFA letter provided as Attachment II to Mr. Vardakas's prefiled direct testimony. All other discussions with customers were verbal

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-23
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-23

Referring to page 2, lines 10-12, please describe in detail any and all electric self-generations systems designed by your company that have been installed by customers in Massachusetts. The identity of the customers may be redacted to protect their privacy. Identify which customers are located in NSTAR Electric's service territory. The description shall include, but not be limited to the following information:

(a) the installation date of the system;

(b) the size (i.e., nameplate rating) of the self-generation unit;

(c) the thermal source used to generate electricity;

(d) the fuel used to produce the energy;

(e) the annual number of kilowatt-hours produced (actual and estimated);

(f) the annual number of hours the self-generation unit is operational; and

(g) the date, duration and size (MW) of outages since the generator came on line. For each outage identify whether it was forced or planned.

Response:

See Attachment NSTAR-NEDGC 1-23. We note that NSTAR is in possession of all information in regards to items (a) – (d) for systems in NSTAR's service territory, as we have pre-filed interconnection applications for every one of our installations prior to installing the DG units. Please see Frank Gundal and his predecessors for this information.

(e) The chart includes estimated number of Kilowatt-hours based on system capacity and annual average run times. See Response to NSTAR-NEDGC- 1- 31.

(f) The chart includes estimated hours of operation based on annual average run times. See Response to NSTAR-NEDGC- 1-31

(g) We do not as a matter of course compile and keep records of outages for each system. On average, our systems are up and running roughly 97% of the time. Outages would be either .06 MW or .075 MW. We note that each site would have at least one .075MW outage per month for oil changes.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-24
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-24

Referring to page 5, lines 4-5, please provide a copy of United Illuminating's Backup Rate Tariff NUS.

Response:

See Attachment NSTAR-NEDGC 1-24.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-25
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-25

Referring to page 5, lines 9-18, please provide a clear example of the application of the Company's proposed tariff that demonstrates the purported circumstances where a customer will be "double charged" for demand charges. Identify all assumptions and provide all formulas and calculations used to create this example.

Response:

The customer would be double charged for demand in those months when the cogenerator had an outage that did not result in a peak billing demand. The customer would be charged for both the Standby demand and the full Supplemental building demand, even though the cogen required Standby service during that month. Again, the rate was designed assuming all DG outages would cause a peak billing demand, and that is just not the case with units that are sized to match thermal loads and thus only generate a portion of the facility's electric consumption. See Attachment NSTAR-NEDGC 1-25.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-26
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-26

Referring to page 6, line 4, please provide any and all documentation to support the assertion that "[t]he typical mid-size customer does not understand their current billing."

Response:

As a service to our customers, we often audit their utility bills for accuracy at their request. In order to do this, the customer must fax/mail their utility invoices to us. If these customers were confident in their ability to read and comprehend their statements, they would not bother to take the time to gather, fax or mail, and review this information with Aegis.

Also attached examples where customers have blindly paid erroneous invoices. In one instance, a customer had paid several months worth of sales tax even though they are a tax-exempt facility. We had found this type of error was quite widespread when NSTAR changed their billing format in 2001. We informed most customers of this error verbally and had them contact NSTAR for refunds. See attached fax dated 8/6/01

The 2nd example involves a customer with a glaringly high peak demand (278kW) even though the historical building average for that month is approximately 130-150kW. The customer had contacted us to explain why the invoice dollars was unusually high. Through telephone conversation, we advised the customer not to pay the bill and to contact NSTAR regarding the high kW charge. Seven days later NSTAR corrected the invoice. The demand had been corrected to a much more reasonable 140kW. There was no explanation from NSTAR as to how the error occurred, and nowhere on the invoice does it indicate that this is a corrected bill. See attached NSTAR Invoices date 7/24/03 & 7/31/03.

It is common to receive calls from our customers when invoice charges are higher then normal. It is rare, if ever, that a customer calls because the kWh consumption seems high, that the demand is high or that with a concern that a portion of the invoice was not accurately calculated.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-27
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-27

Referring to page 6, lines 10-12, please provide a record of all invoice inaccuracies issued by NSTAR Electric to its customers that you are aware of that raise the stated concern over invoice inaccuracies. Please provide all documents that support this response.

Response:

Fourteen (14) examples of invoice inaccuracies are attached ranging from cancelled bills, estimated bills, and delayed invoicing. We have also attached correspondence with NSTAR requesting net energy billing for 2 sites, which meet all the requirements of a Net Energy Customer. At one site, the customer WAS a Net Energy Customer, NSTAR just stopped reading their reversing meter. These requests date back to June 2002 and August 2002. As of this date, neither site is being billed as a Net Energy Customer.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-28
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-28

Referring to page 6, lines 19-20, please identify and provide all documents that support the conclusion that "costly, complex metering is needed to properly apply this rate to small scale CHP."

Response:

The metering proposed in the CT backup rate case (DN02-02-06) was described ".. metering equipment could be fairly expensive". Laundryman testimony CT DPUC DN 02-02-06 Pg 76 lines 11-12. (See attachment NSTAR - NEDGC 1-18).

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-29
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-29

Referring to page 7, lines 4-5, please identify what rate of return is required for a facility to make the discretionary purchase of a CHP system. Provide all documents, studies and analysis to support your response.

Response:

Through 18+ years of business in the DG business, we have found that typically a customer will not proceed with DG unless the payback is 6 years or under, with most installations having a payback period well under 6 yrs.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-30
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-30

Provide all documents, studies and analysis that identify the rate of return that would be earned by a CHP system under NSTAR Electric's proposed standby rates.

Response:

Please see Attachment NSTAR-NEDGC 1-30.

The Attachment NSTAR-NEDGC 1-30 is our best interpretation of the SB2 rate. We have found the description of the supplemental portion of Rate SB2 to be very vague. According to page 4 of M.D.T.E NO. 137A "the demands used to determine the billing demand for the **Distribution** charges [only] under this Supplemental Delivery Service will be reduced by the difference between the amount of the Contract Demand and the actual output of the Generation Units(s) for the period of the reduction or outage." Since there will now potentially be 2 different demands on one bill (one reduced Distribution demand and a higher Transmission/Transition demand) the question arises as to which demand will be used to calculate the Next 150 hours of use block for the kWh portion of the bill.

Two demands on one monthly invoice will also lead to further customer confusion.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-31
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-31

Referring to page 8, lines 10-12, please provide all documents, studies, data, and analysis to support the assertion that "even accounting for scheduled maintenance and unscheduled outages typical systems annually operate 97 percent of the time."

Response:

Please see Attachment NSTAR-NEDGC 31.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-32
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-32

For all systems located in NSTAR Electric's service territory, identify the number of planned outages for each facility in 2003, the number of unplanned outages for each facility, the duration of each outage, the reason(s) for the planned or unplanned outage; and the duration of the outage. If the outage was less than 24 hours, list the hours of the day during which the outage occurred.

Response:

Machines are scheduled to be down once a month for scheduled service and down for a full day for major component changes once every several years. Scheduled services are typically done either at times of low demand or on weekends where there is a fifty-five percent (55%) demand reduction credit.

NSTAR Electric
Department of Telecommunications and Energy
D.T.E. 03-121
Information Request: NSTAR-NEDGC 1-33
April 6, 2004
Person Responsible: Mr. Vardakas

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF TELECOMMUNICATIONS AND ENERGY

Information Request NSTAR-NEDGC 1-33

Referring to Attachment 2, letter from MassHousing to Mr. Vardakas, please provide all correspondence between MassHousing and Mr. Vardakas relating to NSTAR Electric'' proposed standby rates.

Response:

The letter previously provided is the only written correspondence.